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09/678,041	10/03/2000	Gary E. Horst	EMCS:027	5663

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EXAMINER

PEREZ, GUILLERMO

ART UNIT PAPER NUMBER

2834

DATE MAILED: 02/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/678,041

Applicant(s)

HORST, GARY E.

Examiner

Guillermo Perez

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamata (U. S. Pat. 6,025,658) in view of Keljik (Electric Motors and Motor Controls; Jeff Keljik; Delmar Publishers 1995; pages 9-12).

Kamata discloses a linear electromagnetic machine comprising:

a movable member (5);
a stationary member (3) defining at least one stationary pole (1c);
a phase winding (5) positioned such that, when current is flowing in the phase winding (5), the at least one stationary pole (1c) is energized; and
a circuit for energizing the phase winding (5) over a plurality of energizing cycles with a unidirectional current of a single polarity (column 3, line 52 through column 4, line 30), the energizing of the phase winding (5) producing a given force tending to cause linear movement of the movable member (3) with respect to the stationary member (5),

Kamata discloses that the movable member (5) defines a plurality of movable poles (column 3, lines 47-52) that pass over the at least one stationary pole (6a) as the movable member (5) moves in the desired direction and wherein at least one of the stationary poles (6a) is different in construction from other of the stationary poles (6c).

Kamata discloses that the movable poles each define a pole width (p_i) and wherein at least one of the movable poles has a width (p_i) that is greater than the width (p_i) of other of the movable poles (figure 8A).

However, Kamata does not disclose that energizing the phase winding also produces a normal force tending to cause movement of the movable and stationary members in a direction normal to the desired linear movement. Kamata does not disclose that the normal force profile experienced by the at least one stationary pole over a first energizing cycle is different from the normal force profile experienced by the at least one stationary pole over a subsequent energizing cycle.

Keljik discloses that energizing phase winding produces a normal force (attracting or repulsing) experienced by the stator poles (which would cause the stator poles to move toward the rotor if it was not retained by the bearings page 9) since the production of a normal force is an inherent property of the magnetic fields. The normal force profile experienced by the at least one stationary pole (6a in figure 7 of Kamata) over a first energizing cycle is different from the normal force profile experienced by the at least one stationary pole (6c) over a subsequent energizing cycle.

It would have been obvious to one having ordinary skill in the art at the time the invention was made that the magnetic field in the poles of Kamata produce normal forces since it was known in the art that an inherent property of the magnetic fields is to produce a normal force as disclosed by Keljik.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the poles of different width at the stationary member and

the plurality of poles at the movable member since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. *In re Einstein*, 8 USPQ 167.

2. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamata (U. S. Pat. 6,025,658) in view of Keljik as applied to claim 2 above, and further in view of Cho (U. S. Pat. 5,959,373).

Kamata and Keljik substantially teaches the claimed invention except that it does not show that the movable poles all have substantially the same width, wherein each movable pole defines an air gap with respect to the stationary pole as it passes over the stationary pole, and wherein the air gap defined by at least one of the movable poles is different from the air gap defined by other of the movable poles.

Cho discloses that the movable poles (634) all have substantially the same width (p_i). Cho discloses that each movable pole (634) defines an air gap with respect to the stationary pole as it passes over the stationary pole. Cho discloses that the air gap defined by at least one of the movable poles (634) is different from the air gap defined by other of the movable poles (see figure 10F). Cho's invention has the purpose of reducing the number of current control systems otherwise required to operate the machine.

It would have been obvious at the time the invention was made to modify the machine of Kamata and Keljik and provide it with the poles and air gap configuration disclosed by Cho for the purpose of reducing the number of current control systems otherwise required to operate the machine.

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamata (U. S. Pat. 6,025,658) in view of Keljik as applied to claim 1 above, and further in view of Delson et al. (U. S. Pat. 6,002,184).

Kamata and Keljik substantially teach the claimed invention except that it does not show that the circuit for energizing the phase winding provides an energizing current to the phase winding over a first energizing cycle that is different from the energizing current provided to the phase winding over a second energizing.

Delson et al. disclose that the circuit for energizing the phase winding provides an energizing current to the phase winding over a first energizing cycle that is different from the energizing current provided to the phase winding over a second energizing cycle (column 36, lines 41-57). The invention of Delson et al. has the purpose of controlling the overall stiffness of the embodiment.

It would have been obvious at the time the invention was made to modify the motor of Kamata and Keljik and provide it with the energizing current pattern disclosed by Delson et al. for the purpose of controlling the overall stiffness of the embodiment.

4. Claims 6-8, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzuka (U. S. Pat. 4,217,508) in view of Keljik (Electric Motors and Motor Controls; Jeff Keljik; Delmar Publishers 1995; pages 9-12).

Uzuka discloses an electromagnetic machine comprising:

a rotor (101) defining a plurality of rotor poles (108A,108b,107a,107G in figure 18A), each rotor pole (108A,108B,107A,107G) having a pole face defining an angular width, wherein the angular width of the rotor pole with the widest width (18A) is:

(a) substantially equal to the angular width of the rotor pole with the narrowest width (108b), and

(b) less than 1.5 times the angular width of the rotor pole with the narrowest width (108b);

a stator (103) defining at least two stator poles (created by windings 110A,110B) that are radially opposed to one another;

a phase winding (110A, 110B) positioned such that, when current is flowing in the phase winding (110A, 110B), the at least two stator poles (induced by windings 110A,110B) are energized; and

a circuit (figure 7A) for energizing the phase winding (110,111) over a plurality of energizing cycles to produce a given desired output on the rotor (column 11, lines 11-52), the energizing of the phase winding (110,111) cause movement of the at least two stator poles towards the rotor (figure 6A);

wherein the influence experienced by the at least two stator poles (created by windings 110,111 in figure 5A) over a first energizing cycle (θ_1 - θ_2 in figure 6A) is different from the influence experienced by the at least two stator poles (created by windings 110,111 in figure 5A) over a subsequent energizing cycle (θ_1 - θ_2 in figure 6A and column 11, lines 11-52). Uzuka discloses that the rotor defines a plurality of pairs of opposing rotor poles (107,108) and wherein:

- a. during the first energizing cycle, a first pair of opposing rotor poles (107) is brought towards alignment with the at least two stator poles (110);
- b. over the second energizing cycle, a second pair of opposing rotor poles (108) is brought towards alignment with the at least two stator poles (110); and
- c. the construction of the poles forming the first pair of opposing rotor poles (107) is different from the construction of the poles forming the second pair of opposing rotor poles (108).

Uzuka discloses that the angular width of the rotor poles forming the first pair of opposing rotor poles is substantially the same as the angular width of the rotor poles forming the second pair of opposing rotor poles (108A, 108b, 107a, 107G in figure 18A). Uzuka discloses that the rotor includes a plurality of permanent magnets (108A, 108b, 107a, 107G in figure 18A).

However, Uzuka does not disclose that the energizing of the phase winding also produces a normal force experienced by the at least two stator poles.

Keljik discloses that energizing phase winding produces a normal force (attracting or repulsing) experienced by the stator poles (which would cause the stator poles to move toward the rotor if it was not retained by the bearings page 9) since the production of a normal force is an inherent property of the magnetic fields. The normal force profile experienced by the at least one pole (in Uzuka) over a first energizing cycle

is different from the normal force profile experienced by another pole over a subsequent energizing cycle.

It would have been obvious to one having ordinary skill in the art at the time the invention was made that the magnetic field in the poles of Uzuka produce normal forces since it was known in the art that an inherent property of the magnetic fields is to produce a normal force as disclosed by Keljik.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the widest pole with a specific size range since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uzuka in view of Keljik as applied to claim 8 above, and further in view of Horst et al. (U. S. Pat. 5,701,064).

Uzuka and Keljik substantially teaches the claimed invention except that it does not show that a maximum air gap established between the first pair of opposing rotor poles and the at least two stator poles is different from the maximum air gap established between the second pair of opposing rotor poles and the at least two stator poles.

Horst et al. disclose that a maximum air gap established between the first pair of opposing rotor poles (22b) and the at least two stator poles (18b in figures 1-2) is different from the maximum air gap established between the second pair of opposing

rotor poles (22a) and the at least two stator poles (18b). The invention of Horst et al. has the purpose of detecting the rotor position.

It would have been obvious at the time the invention was made to modify the motor of Uzuka and Keljik and provide it with the air gap configuration disclosed by Horst et al. for the purpose of detecting the rotor position.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uzuka in view of Keljik and further of Horst et al. as applied to claim 9 above, and further in view of Habermann (U. S. Pat. 4,774,424).

Uzuka, Keljik and Horst et al. substantially teaches the claimed invention except that it does not show that the maximum air gap established between the first pair of opposing rotor poles and the at least two stator poles is defined by a notch in the profile of the face of the rotor pole.

Habermann discloses that the maximum air gap established between the first pair of opposing rotor poles and the at least two stator poles is defined by a notch (31) in the profile of the face of the rotor pole. Habermann's invention has the purpose of effect a direct measuring of the induction in the air gap of an electromagnetic machine.

It would have been obvious at the time the invention was made to modify the machine disclosed by Uzuka, Keljik and Horst et al. and provide it with the notch disclosed by Habermann for the purpose of effect a direct measuring of the induction in the air gap of an electromagnetic machine.

7. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzuka in view of Keljik as applied to claim 6 above, and further in view of Delson et al. (U. S. Pat. 6,002,184).

Uzuka and Keljik substantially teaches the claimed invention except that it does not show that the circuit for energizing the phase winding provides an energization current to the phase winding over a first energization cycle that is different from the energization current provided to the phase winding over a second energization cycle.

Delson et al. disclose that the circuit for energizing the phase winding provides an energization current to the phase winding over a first energization cycle that is different from the energization current provided to the phase winding over a second energization cycle (column 36, lines 41-57). The invention of Delson et al. has the purpose of controlling the overall stiffness of the embodiment.

It would have been obvious at the time the invention was made to modify the motor of Uzuka and Keljik and provide it with the energization current pattern disclosed by Delson et al. for the purpose of controlling the overall stiffness of the embodiment.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over E. R. Lang (U. S. Pat. 3,260,871) in view of Keljik.

E. R. Lang discloses an electromagnetic machine comprising:

a rotor (74) defining a plurality of rotor poles (N,S), each rotor pole (N,S) having a pole face (76) defining an angular width, wherein the angular widths of each of the rotor poles (N,S) are substantially the same (figure 6B);

a stator defining a first set of opposing stator poles (formed by coils 80) and a second set of opposing stator poles, each of the stator poles (formed by coils 80) being associated with at least one current carrying member (80) such that a stator pole is energized when current is flowing through a current carrying member associated with the stator pole (figures 8-9); and

a circuit (figure 8) for energizing the at least one current carrying member (80) over a given interval (figure 9) so as to simultaneously energize the first and second sets of opposing stator poles (figure 8);

the influence experienced by the first pair of opposing stator poles over the given interval is substantially different from the influence experienced by the second pair of opposing stator poles over the given interval. However, E. R. Lang does not disclose that energizing of the current carrying member also produces normal forces tending to cause movement of the energized stator poles towards the rotor.

Keljik discloses that energizing phase winding produces a normal force (attracting or repulsing) experienced by the stator poles (which would cause the stator poles to move toward the rotor if it was not retained by the bearings page 9) since the production of a normal force is an inherent property of the magnetic fields. The normal force profile experienced by the at least one pole (in E. R. Lang) over a first energizing cycle is different from the normal force profile experienced by another pole over a subsequent energizing cycle.

It would have been obvious at the time the invention was made for the magnetic fields of E. R. Lang to apply a normal force between the fixed and movable poles of the machine since it is an inherent property of the magnetic fields.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over E.

R. Lang in view of Keljik as applied to claim 14 above, and further in view of Uzuka.

E. R. Lang and Keljik substantially teaches the claimed invention except that it does not show that during the given interval, a second pair of opposing rotor poles is brought towards alignment with second set of opposing stator poles; and that

the construction of the poles forming the first pair of opposing rotor poles is different from the construction of the poles forming the second pair of opposing rotor poles.

Uzuka discloses that during the given interval, a second pair of opposing rotor poles (107) is brought towards alignment with second set of opposing stator poles (110); and that

the construction of the poles forming the first pair of opposing rotor poles (108) is different from the construction of the poles forming the second pair of opposing rotor poles (108). Uzuka's invention has the purpose of avoiding the reduction of the operational torque generated over 360 degrees to zero torque.

It would have been obvious at the time the invention was made to modify the motor of E. R. Lang and Keljik and provide it with the rotor poles configuration disclosed

by Uzuka for the purpose of avoiding the reduction of the operational torque generated over 360 degrees to zero torque.

10. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over E.

R. Lang in view of Keljik as applied to claim 14 above, and further in view of Nitta (U. S. Pat. 6,181,047).

E. R. Lang and Keljik substantially teaches the claimed invention except that it does not show that the construction of the stator poles comprising the first set of opposing stator poles is different from the construction of the stator poles comprising the second set of opposing stator poles.

Nitta discloses that the construction of the stator poles comprising the first set of opposing stator poles (5) is different from the construction of the stator poles comprising the second set of opposing stator poles (4) for the purpose of improving starting characteristics in permanent magnet motors.

It would have been obvious at the time the invention was made to modify the motor of E. R. Lang and Keljik and provide it with the stator poles configuration disclosed by Nitta for the purpose of improving starting characteristics in permanent magnet motors.

11. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over E. R. Lang in view of Keljik and further of Nitta as applied to claim 15 above, and further in view of Horst (U. S. Pat. 5,670,836).

E. R. Lang, Keljik and Nitta substantially teaches the claimed invention except that it does not show that each of the stator poles in the first set of opposing stator poles defines a notched surface.

Horst discloses that each of the stator poles in the first set of opposing stator poles defines a notched surface (C). Horst's invention has the purpose of positioning the rotor in a stable detent position to facilitate starting of the machine.

It would have been obvious at the time the invention was made to modify the machine of E. R. Lang, Keljik and Nitta and provide it with the notch configuration disclosed by Horst for the purpose of positioning the rotor in a stable detent position to facilitate starting of the machine.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over E.

R. Lang in view of Keljik as applied to claim 14 above, and further in view of Delson et al.

E. R. Lang and Keljik substantially teaches the claimed invention except that it does not show that the circuit for energizing the at least one current carrying member provides an energization current to the first current carrying member that is different from the energization current provided to the second current carrying member over the given interval.

Delson et al. disclose that the circuit for energizing the at least one current carrying member provides an energization current to the first current carrying member that is different from the energization current provided to the second current carrying

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member over the given interval (column 36, lines 41-57). The invention of Delson et al. has the purpose of controlling the overall stiffness of the embodiment.

It would have been obvious at the time the invention was made to modify the motor of E. R. Lang and Keljik and provide it with the energization current pattern disclosed by Delson et al. for the purpose of controlling the overall stiffness of the embodiment.

Response to Arguments

Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

In response to Applicants' remark that the poles, windings, and energizing disclosed in Figures 5 and 6 of Uzuka do not correspond to the motor of Figure 18A, but to the motor in Figures 3-4, it must be noted that sizing permanent magnets to be equal one to the other or different one from the other would have been obvious to one having ordinary skill in the art at the time the invention was made since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Uzuka provided exemplary magnets sizes, which range from being extremely larger one than the other to being identical one to the other depending on how balanced is the output torque required for rotation.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by

combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In response to applicant's argument that the poles 20 do not define first and second sets of opposed stator poles, it must be noted that poles 20 as well as 80 define first and second sets of opposed stator poles (see figures 1 and 7 of Lang).

In response to applicant's argument that the circuit of Figures 1 and 3 do not disclose "a circuit for energizing the at least one current carrying member over a given interval so as to simultaneously energize the first and second sets of opposing stator poles", it must be noted that those limitations are shown in figures 8 and 9 of Lang.

In response to applicant's argument that the rotor in Lang is eccentric, it must be noted that the angular widths of each of the rotor poles (N,S in figure 6B) are substantially the same, as claimed.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

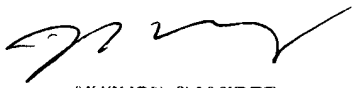
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guillermo Perez whose telephone number is (703) 306-5443. The examiner can normally be reached on Monday through Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703) 308 1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3432 for regular communications and (703) 305 3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

Guillermo Perez
February 22, 2003



GUILLERMO PEREZ
SUPERVISOR
TECHNOLOGY UNIT 1100